NHDOT SPR2 PROGRAM
RESEARCH PROGRESS REPORT

INSTRUCTIONS:

Project # SPR 26962V		**Report Period** Year 2019 ☐Q1 (Jan-Mar) ☐Q2 (Apr-Jun) ☐Q3 (Jul-Sep) XQ4 (Oct-Dec)
Project Title: Using Data Analytics in Forecast Bridge Condition		
Project Investigator: Erin Bell **Phone: 603-862-3850**		**E-mail: erin.bell@unh.edu**
Project Start Date: 07/31/2019	**Project End Date:** 12/31/2021	**Project schedule status:** ☐ On schedule ☐ Ahead of schedule X Behind schedule

Brief Project Description:

Reliable data-driven forecasting models allow for public agencies to plan for future needs and resource allocation. Conditions of bridge assets are managed through maintenance, preservation, rehabilitation and reconstruction. The New Hampshire Department of Transportation documents the appropriate timing of these treatments in Recommended Investment Strategies (RIS). According to NHDOT best practice and expert judgement adhering to a bridge's RIS extends useful service life. Quantification of the service life extension as well as tracking how well bridge investments have adhered to RIS remains a challenge. Bridge work is often documented in disparate formats through multiple bureaus and systems.

Element-level condition assessment data is collected and tracked in a standardized format for each bridge asset in a transportation network. Maintenance and repair records, however, are not and must be tabulated before correlation with other data. Correlating this tabulated data with conditions will support the development of deterioration models that function according to treatment actions, environmental condition and traffic usage. Condition forecasting using such deterioration models will provide insight into the long term ramifications of investment strategies that leverage varying amount of maintenance, preservation, and rehabilitation

Objective of this project:

1. Data Collection and storage tool for bridge investment records
2. Recommended Investment Strategy adherence measure and effectiveness measure
3. Recommendation of appropriate deterioration models of NH bridge inventory
4. Proof-of-concepts deterioration forecast using a sample data set

Progress this Quarter (include meetings, installations, equipment purchases, significant progress, etc.):

The TAG Kick Off meeting for this project was held on September 27th 2019. At this meeting, UNH informed that TAG that due to the late start date on the project, a graduate student would not be funded by the project until January 2020.

The criterion for the selection of a bridge set for the proof-of-concept application for bridge condition forecasting was discussed. It was determined that selecting similar bridge type; in terms of ADT, span length, and material; from Tiers 1 through 5 would be the most beneficial to the project. The inclusion of Tier 5 bridges would highlight the impact of the adherence to the RIS, given that most municipal bridge managers do not follow the RIS.

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After this meeting, UNH began the literature survey of best practices for bridge subset selection and bridge condition forecasting using maintenance data. This survey should be completed during the next quarter.

Items needed from NHDOT (i.e., Concurrence, Sub-contract, Assignments, Samples, Testing, etc…):

Access to bridge maintenance records, including cost, level of repair and impact on structural performance.

Anticipated research next three (3) months:

Investigation into the type of maintenance data available at the NHDOT and determination of the best protocol to summarize the present state of data collection and storage and develop future data needs, in terms of type and collection methods, for bridge condition forecasting. This will require access to the NHDOT maintenance records.

Complete the literature survey of best practices for maintenance data collection for bridge condition forecasting.

Prepare the preliminary characteristics for the selection of the subset of bridges.

Circumstances affecting project:

The project start date precluded starting a graduate student in September 2019. The project progress will increase once a graduate student is included on the research team, which will be in January 2020.

Tasks (from Work Plan)	Planned % Complete	Actual % Complete
Task 1: Assessment of published data mining and analysis to select the appropriate scheme for NHDOT based on inventory and investment records. This assessment will include an evaluation of data availability and actions needed to improve availability, if appropriate.	75	25
Task 2: Development of a framework to measure adherence to RIS.	25	0
Task 3: Data mining and preparation of element-level Bridge condition assessment data and maintenance records.	0	0
Task 4: Development of network level deterioration functions for bridge elements	0	0
Task 5: Proof-of-concept deterioration forecasts using sample adherences for New Hampshire bridges for girder type bridges, including network-wide and region/corridor specific zones.	0	0
Task 6: Report Research Results and Deliver Final Products	0	0